

CLAIMS

Having thus described out invention, what we claim as new and desire to secure by Letters Patent is as follows:

- 1 1. Process for producing a three-dimensional bioartificial tissue having
2 viable cells in or on a matrix and with which the cells and matrix can be
3 cultivated to a tissue or a precursor of it, comprising the steps of:
4 inserting at least one vessel supplied from the outside into a tissue at
5 the beginning of its production; and
6 cultivating said tissue in a manner of hereby vessels propagate into the
7 tissue and a vascularized bioartificial tissue is obtained.
- 1 2. Process according to Claim 1, wherein vessels are of natural origin
2 selected from the group consisting of humans and animals.
- 1 3. Process according to Claim 1, wherein the vessel is a synthetic vessel,
2 produced from a biologically compatible polymer.
- 1 4. Process according to Claim 1, wherein the vessel has lateral openings
2 departing from a longitudinally extended vessel lumen.
- 1 5. Process according to Claim 1, wherein the vessel is a porous vessel. .
- 1 6. Process according to Claim 5, further comprising the step of preparing
2 the porous vessel punctually with a substance or means initiating a stimulus
3 for vascular propagation.

- 1 7. Process according to one of Claims 1 further comprising the step of the
2 vessel supplying perfused with blood or a culture medium.
- 1 8. Process according to Claim 7 wherein substances promoting
2 angiogenesis, particularly growth factors, preferably VEGF (vascular
3 endothelial cell growth factor) are added to the culture medium.
- 1 9. Process according to Claim 7 wherein the perfusion is accomplished
2 under pressure.
- 1 10. Process according to Claims 7 wherein the perfusion is accomplished
2 in pulses.
- 1 11. Process according to Claims 7 wherein the vessel is held between inlet
2 and outlet lines needed for the perfusion so that it is simultaneously
3 positioned and fixed in relation to the tissue being cultivated.
- 1 12. Process according to Claim 1 wherein cardiomyocytes are used as cells
2 within the three-dimensional tissue to be vascularized, and the tissue obtained
3 is a bioartificial heart tissue.
- 1 13. Process according to Claim 1 wherein keratinocytes are used as the
2 cells, and the tissue obtained is a bioartificial skin tissue.
- 1 14. Vascularized bioartificial tissue, particularly obtained according to
2 Claim 1 wherein at least one vessel passes through said tissue from which
3 other vessels are propagated into the tissue.

- 1 15. Vascularized bioartificial tissue according to Claim 14 wherein in that
2 vessel is selected from the group consisting of a vessel of natural origin from
3 human or animal, and a biocompatible synthetic vessel.
- 1 16. Vascularized bioartificial tissue according to Claim 14 wherein the
2 tissue is a synthetic heart tissue having cardiomyocytes in a matrix.
- 1 17. Vascularized bioartificial tissue according to Claim 14 wherein the
2 tissue is a synthetic skin tissue having keratinocytes in a matrix.
- 1 18. Experimental reactor for controlled production of a bioartificial tissue,
2 according to Claim 1, at least one tissue culture chamber; at least one inlet
3 and outlet for said tissue culture chamber; and two opposite, plane, parallel
4 and optically transparent boundary walls for said tissue culture chamber.
- 1 19. Experimental reactor according to Claim 18, further comprising at
2 least one closable inlet and outlet for each chamber; and a closing means.
- 1 20. Experimental reactor according to Claim 18 wherein said tissue
2 culture chamber includes a means for holding a matrix or a vessel.
- 1 21. Experimental reactor according to Claim 18 wherein said at least one
2 inlet and one outlet hold a vessel.
- 1 22. Experimental reactor according to Claim 18 wherein at least one of
2 the plane optically transparent boundary walls of the chamber is designed as a

3 lid.

1 23. Experimental reactor according to Claim 23 further comprising
2 additional input points above each chamber in a replaceable lid.

1 24. Experimental reactor according to Claim 18 further comprising
2 electrical connections and/or electrical components are provided in said at
3 least one tissue culture chamber.

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